

COORDINATE GEOMETRY

(4 marks)

$$A(x_1, y_1) \quad B(x_2, y_2)$$

$$A(3, 4) \quad B(5, 8)$$

$x_1 \quad y_1 \quad x_2 \quad y_2$

1 Midpoint = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

$$M = \left(\frac{3+5}{2}, \frac{4+8}{2} \right) = (4, 6)$$

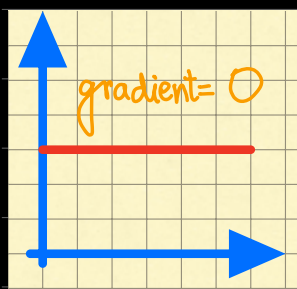
2 DISTANCE = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$$D = \sqrt{(5-3)^2 + (8-4)^2} = 4.472$$

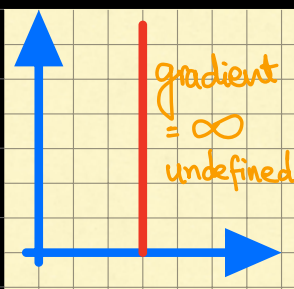
3 Gradient = Slope = $\frac{y_2 - y_1}{x_2 - x_1}$
(m)

$$m = \frac{8-4}{5-3} = \frac{4}{2} = 2$$

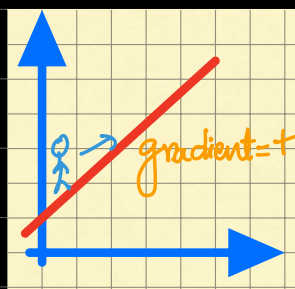
GRADIENT OF A LINE: Note: Stick figure always goes Left to Right.



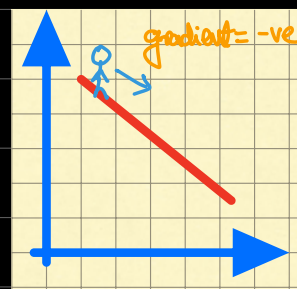
Horizontal



Vertical

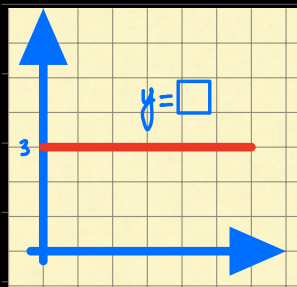


upward



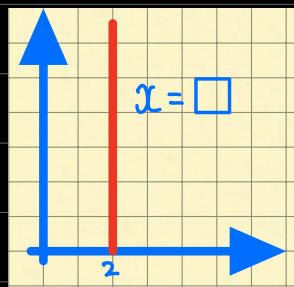
Downward

EQUATION OF A LINE



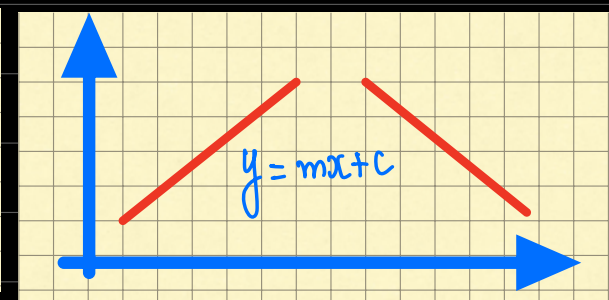
HORIZONTAL

$$y = \square$$



VERTICAL

$$x = \square$$



SLANTING LINES.

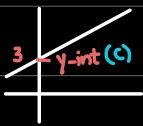
$$y = mx + c$$

EQUATION OF A SLANT LINE

METHOD 1

$$y = mx + c$$

Given: 1) gradient (m)



2) y-intercept (c)
(point where graph cuts y-axis)

Q: Find equation of line that has slope 2 and cuts y-axis at 5.

$$m = 2 \quad c = 5$$

$$y = mx + c$$

$$y = 2x + 5$$

METHOD 2

$$y - y_1 = m(x - x_1)$$

Given: 1) Gradient (m)

2) A point on line (x_1, y_1)

Q: Find equation of line that has slope 3 and passes through point $(1, 5)$.

$$m = 3$$

$\downarrow$ $\downarrow$
 x_1 y_1

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 3(x - 1)$$

$$y = 3x - 3 + 5$$

$$y = 3x + 2$$

Q: Find equation of line which has slope 2 and it passes through $(7, 11)$

$$m = 2$$

$\downarrow$ $\downarrow$
 x_1 y_1

$$y - y_1 = m(x - x_1)$$

$$y - 11 = 2(x - 7)$$

$$y = 2x - 14 + 11$$

$$y = 2x - 3$$

Q: Find equation of line which has slope -2 and it passes through $(3, -1)$.

$\downarrow$ $\downarrow$
 x_1 y_1

$$y - y_1 = m(x - x_1)$$

$$y - (-1) = -2(x - 3)$$

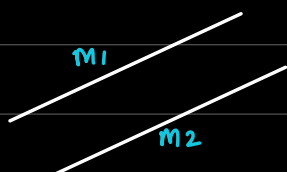
$$y + 1 = -2x + 6$$

$$y = -2x + 5$$

Question	Answer	Marks	Partial Marks
26(a)	(1, 5)	1	
26(b)	$2y + 3x = 13$ or 3 term equation	4	M1 for $[\text{grad } AB] = \frac{7-3}{4-2}$ or $\frac{-1}{-1}$ M1 for their gradient AB M1 for substitution of their (1,5) into $y = (\text{their } m)x + c$ or $y - y_1 = (\text{their } m)(x - x_1)$ If 0 scored, SC1 for sketch showing l is the perpendicular bisector of AB .

NOTES

1 PARALLEL LINES



$m_1 = m_2$

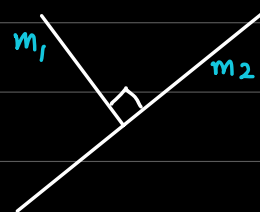
Parallel lines have same gradients.

Right angle $\nwarrow$ $\uparrow$ Perpendicular $\nearrow$ Normal.
 90° $\searrow$ orthogonal

PERPENDICULAR LINES

1

$m_1 \times m_2 = -1$



2

SHORTCUT: **NEGATIVE RECIPROCAL**

$m_1 = 3 \longrightarrow m_2 = -\frac{1}{3}$

$$m_1 = \frac{1}{2} \longrightarrow m_2 = -\frac{2}{1} = -2$$

$$m_1 = -\frac{4}{3} \longrightarrow m_2 = +\frac{3}{4}$$

2] HOW TO TELL GRADIENT OF A LINE FROM ITS EQUATION:

$$3y - 2x = 12$$

Step 1: Make y-subject

Step 2: Compare with

$$y = mx + c$$

$$\boxed{\begin{array}{l} \text{gradient} = \frac{2}{3} \\ y\text{-int} = 4 \end{array}}$$

$$3y - 2x = 12$$

$$3y = 2x + 12$$

$$y = \frac{2}{3}x + \frac{12}{3}$$

$$y = \frac{2}{3}x + 4$$

$$y = mx + c$$

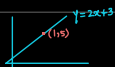
3] IF A POINT LIES ON A LINE, IT MUST SATISFY ITS EQUATION.

Q. Check if $(1, 5)$ lies on $y = 2x + 3$ or not?

$$y = 2x + 3 \quad \begin{array}{l} x=1 \\ y=5 \end{array}$$

$$5 = 2(1) + 3$$

$$5 = 5 \quad \text{yes } (1, 5) \text{ lies on } y = 2x + 3$$



Q. Given that $(3, k)$ lies on $2y = 3x + 1$ find value of k.

$$2y = 3x + 1$$

$$2(k) = 3(3) + 1$$

$$2k = 10$$

$$k = \frac{10}{2} = 5$$

4

IF A POINT LIES ON X-AXIS , PUT $y=0$

IF A POINT LIES ON Y-AXIS , PUT $x=0$

Q: Line $3x + 4y = 12$ cuts x axis at P and it cuts y -axis at Q. Find coordinates of P and Q.

P x -axis ($y=0$)

$$3x + 4y = 12$$

$$3x + 4(0) = 12$$

$$3x = 12$$

$$x = 4$$

$$P(4, 0)$$

Q y -axis ($x=0$)

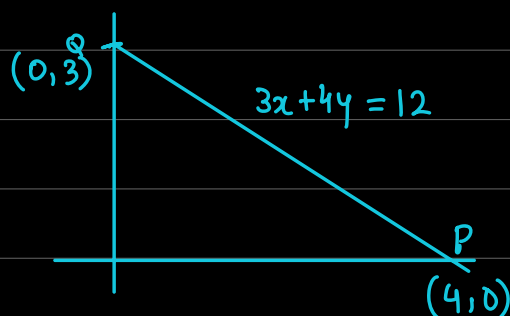
$$3x + 4y = 12$$

$$3(0) + 4y = 12$$

$$4y = 12$$

$$y = 3$$

$$Q(0, 3)$$



Syllabus change 2025: Students are not required to "DRAW" perpendicular Bisectors.

They are required to make equations for Perpendicular Bisector.

90° cuts in two equal parts

90°

cuts in two equal parts

Q: Find the equation of perpendicular Bisector of $A(1, 3)$ and $B(5, 11)$.

Perpendicular
Bisector.

Step 1: Midpoint = $\left(\frac{1+5}{2}, \frac{3+11}{2}\right) = (3, 7)$

Step 2: gradient of $\frac{11-3}{5-1} = \frac{8}{4} = 2$

gradient of perpendicular bisector' = $-\frac{1}{2}$

Step 3 :

$$m = -\frac{1}{2}$$

$$M(3, 7)$$

$$y - y_1 = m(x - x_1)$$

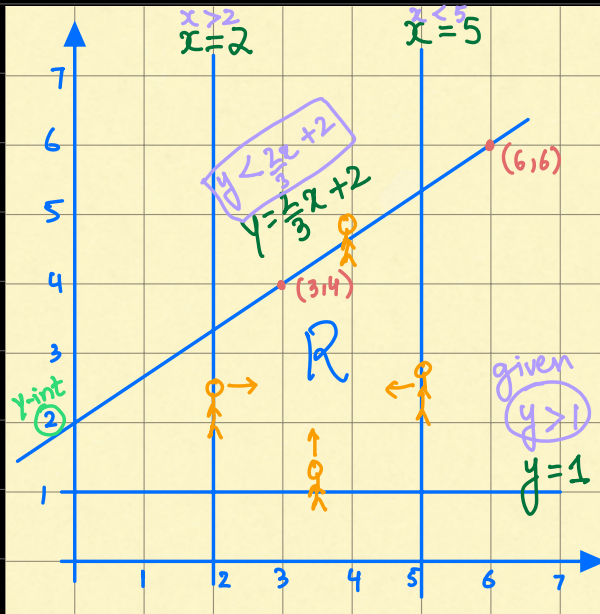
$$y - 7 = -\frac{1}{2}(x - 3)$$

$$2y - 14 = -x + 3$$

$$2y = -x + 17$$

$$y = \frac{-x + 17}{2}$$

SHADING INEQUALITIES (2-3 marks)



Region R is enclosed by 4 lines. Write down 3 inequalities that enclose region R. One inequality is $y > 1$.

Ans:

$$\begin{aligned} x &> 2 \\ x &< 5 \\ y &< \frac{2}{3}x + 2 \end{aligned}$$

For slant line:

1) gradient: $\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 4}{6 - 3} = \frac{2}{3}$

$(3, 4)$ $(6, 6)$
 x_1, y_1 x_2, y_2

2) y-int (from graph)
 $c = 2$

$$y = mx + c$$

$$y = \frac{2}{3}x + 2$$

STEPS: 1) Find equation of all lines, make y-subject and label on graph.

2) Now decide $>$ or $<$ sign

above line means $>$

below line mean $<$

Exception: For vertical line do not check

above / below:

Right means $>$

Left means $<$